Trauma Patient Care Guidelines

Trauma Table of Contents

TRAUMA PATIENT CATERGORIES AND TRANSPORT

It is the responsibility of all Providers to be familiar with criteria associated with each category, properly designate trauma patients accordingly, and report patient classification as quickly as possible to other responding resources. The goal of the Utah County EMS System is to have all Category I and II patients off the scene in less than 10 minutes if at all possible.

It is generally agreed that Utah Valley Regional Medical Center can handle up to 3 multi-trauma or unstable patients at a time with the remaining facilities in Utah County able to handle up to 2 multi-trauma or unstable patients. These restrictions should be considered when transporting patients from a multi-patient trauma situation. Utah State Trauma Guidelines should be considered with all trauma patients.

CATEGORY I TRAUMA
Critical Patients

Category I patients may require immediate, life-saving interventions. If any one or more of the following situations exist in a trauma patient they should be transported to a trauma center (Intermountain Medical Center (IMC), U of U, UVRMC or Primary Children's Hospital for patients under 16 years old) or the closest facility capable of handling the patient until transport to a trauma center can be arranged. Consideration should always be given to activating an Air Medical Transport Service (AMTS) and following the *Helicopter Transport Guidelines for Critical Trauma Patients.*

1. Glasgow coma score **less than or equal to 12** associated with trauma
2. Physiologic criteria
   Use any one of the following*:*
   - **Adults**
     - *Systolic Blood Pressure* Less than 90 mmHg
     - *Respiratory Rate* Less than 10, or greater than, 29 breaths / minute
   - **Children Less Than 5 Years**
     - *Systolic Blood Pressure* Less than 70 + (age in years x 2) mmHg
     - *Heart Rate* Less than 60 or greater than 180
     - *Respiratory Rate* Less than 10 breaths / minute
   - **Children Greater Than 5 Years up to 16 years old**
     - *Systolic Blood Pressure* Less than 70 + (age in years x 2) mmHg
     - *Heart Rate* Greater than 160
     - *Respiratory Rate:* Less than 10 breaths / minute
3. Airway obstruction and/or intubation
4. Depressed or open skull fracture
5. Flail chest
6. Traumatic Limb Injuries
   a. Paralysis of any limb
   b. Two or more Humerus or Femur Fractures
   c. Amputation proximal to ankle or wrist
   d. Major Crush Injuries
7. Penetrating (GSW, Stab, etc) wounds to the head, neck, torso or extremities proximal to elbow or knee
8. CO2 Poisoning with Altered Level of Consciousness
9. Burns (Attempt to transport Category 1 Trauma Burn patients to the University of Utah Hospital if possible by AMTS)
   a. Inhalation injuries
   b. Partial or full thickness (2^{nd} or 3^{rd} degree) burns greater than 20% body surface area
   c. Major trauma with burns
   d. Significant portions of the face, hands, or perineum

Bypass: In the Utah County EMS System UVRMC is the only designated Trauma II center. Ground ambulances MAY bypass another hospital if they have a Category I Trauma patient and they are within

20 minutes of a trauma center. Otherwise, ground ambulances will require contact and direction from the OLMC physician. Ground ambulances may NOT bypass another hospital if they have a Category I Trauma patient who;

1. Does NOT have the airway secured appropriately.
2. IS in traumatic arrest.

Note: Once appropriately designated, Category I patients should not be downgraded to a lesser trauma category (II or III), regardless of additional findings or improvement in physiologic status. Transport providers should provide an initial hospital radio report on all Category I or II trauma as soon as appropriate after loading and initiation of transport. **Early notification allows the receiving physician to activate an internal trauma alert system (if needed) prior to patient arrival**.

CATEGORY II TRAUMA
Emergent Patients

These patients may require urgent assessment - within 30 minutes - by a surgeon to evaluate for both actual and potential injuries. Category II patients should be transported to the closest available hospital for evaluation. If at any time during the transport the patient's condition needs to be upgraded to Category I then the receiving facility should be notified and consideration should be given to activating an Air Medical Transport Service (AMTS).

1. Motor vehicle collisions with any one of the following:
   - **a.** Ejection from moving vehicle
   - **b.** Death in the same passenger compartment
   - **c.** Auto roll-over greater than 90 degrees rotation
   - **d.** Steering wheel damage
   - **e.** Auto-pedestrian incident
   - **f.** Auto-bicycle collisions
2. Extrication time greater than 20 minutes
3. Motorcycle or watercraft crashes greater than 20 mph
4. Any significant traumatic incident in patients less than 5 years or greater than 55 years of age
5. Falls
   - **a.** Greater than 10 feet in patients less than 10 yrs., or greater than 55 yrs. of age
   - **b.** Greater than 20 feet in other patients
6. Burns
   - **a.** Partial or Full Thickness burns, greater than 5% and less than 20% body surface area
7. Blunt trauma patients with concomitant medical diseases or processes, including;
   - **a.** Immunosuppression (i.e., HIV, TB, chemotherapy treatment for cancer etc.)
   - **b.** Coagulopathy (i.e. Hemophilia, Von Willebrand's disease, factor IX deficiency)
   - **c.** Pregnancy

CATEGORY III
TRAUMA
Non-emergent Patients

Any injured patient not meeting Category I or II definitions is considered a Category III Trauma patient. Category III patients may be transported to the hospital of their choice.

Key to Symbols used in Guidelines

This symbol and yellow highlighted instructions precedes any treatment that requires OLMC prior to initiating the treatment unless otherwise specified.

AMPUTATIONS

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Direct pressure to control hemorrhage
  - If amputation is incomplete, splint affected digit or limb in physiologic position
    - Amputated Body Parts and/or Tissue
      - All retrievable tissue should be transported (do not delay transport for tissue retrieval)
      - Rinse part(s) with NS
      - Wrap tissue in sterile gauze moistened with NS
      - Place tissue into plastic bag or container.
      - Place bag / container into separate container filled with ice
      - Do not allow tissue to come into direct contact with ice
    - Tooth Avulsion
      - Handle tooth by chewing surface only. Avoid touching the root.
      - Rinse with water. Do not scrub, dry, or wrap tooth in tissue or cloth.
      - Place tooth in container of (**in order of preference**)
        - Patient's Saliva
        - Milk
        - Normal Saline
        - Water

ADULT	PEDIATRIC (<37 kg or 80 lbs)
EMT- BASIC PROVIDER	**EMT- BASIC PROVIDER**
EMT- INTERMEDIATE PROVIDER	**EMT- INTERMEDIATE PROVIDER**
❑ Advanced airway, vascular access and fluid therapy per *Resuscitation and Perfusion Core Principle*	❑ Same as adult
PARAMEDIC	**PARAMEDIC**

BRAIN TRAUMATIC INJURY

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Spinal movement restriction per *Disability Core Principle*
    - Elevate head of spinal board or stretcher 30 degrees
  - Ventilation rates per Resuscitation and Perfusion Core Principles
  - In cases of obvious or potential skull fracture, use caution when applying direct pressure to bleeding from nose
  - Open skull fractures should be covered with non-pressure dry sterile dressings

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Core Principle*
  - Limit fluid bolus to 250 – 500 mL NS

PARAMEDIC

- ❑ Ventilate to maintain EtC02 between 32 -35 mmHg when capnography is available

Evidence of neurotrauma

- ❑ **Lidocaine 1.5 mg/kg** 3 minutes prior to intubation

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**.** *(Goal is to maintain a mean arterial pressure (MAP) >70 mmHg)*

And/Or

- ❑ **Epinephrine (1:1,000) 2–10 mcg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**. (**Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

Vascular access and fluid therapy per *Resuscitation and Perfusion Core Principle*

- Limit fluid bolus to 10 mL/kg NS

PARAMEDIC

- ❑ Ventilate to maintain EtC02 between 32 -35 mmHg when capnography is available

Evidence of Neurotrauma

- ❑ **Lidocaine 1.5 mg/kg** 3 minutes prior to intubation

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg

OR

- ❑ **Epinephrine (1:1,000) 0.1–1 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg. (Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)

BURNS – ELECTRICAL / LIGHTNING

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
  - Safely evacuate patient from electrical source
  - When multiple patients are struck simultaneously by lightning or a high voltage source, those in respiratory and/or cardiac arrest should be given the highest priority of care, even those who appear dead on initial evaluation.
- ❑ Focused history and physical exam
  - Identify potential entry and exit wounds
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Remove items that may constrict swelling tissue
  - Be alert to the possibility of impending cardiac arrest.
  - Spinal motion restriction in the unconscious patient
  - Dressings
    - Partial or Full Thickness (2^{nd} or 3^{rd} degree) <10% BSA - Wet sterile dressings
    - Partial or Full Thickness (2^{nd} or 3^{rd} degree) >10% BSA - Dry sterile dressings
  - Maintain patient warmth
- ❑ For Category I burned patients consider AMTS transport from the scene to a designated burn center
  - Inhalation injuries
  - Partial or Full Thickness (2^{nd} or 3^{rd} degree) burns greater than 20% body surface area
  - Major trauma with burns
  - Significant portions of the face, hands, or perineum
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available.
  - If possible, avoid placing electrodes over burned skin

ADULT	PEDIATRIC (<37 kg or 80 lbs)
EMT- BASIC PROVIDER	**EMT- BASIC PROVIDER**
EMT- INTERMEDIATE PROVIDER	**EMT- INTERMEDIATE PROVIDER**
❑ Advanced airway, vascular access per *Resuscitation and Perfusion Core Principle* • If possible, avoid placing IV through burned skin ❑ Partial or Full Thickness (2^{nd} or 3^{rd} degree) >10% BSA – Fluid therapy following Parkland Burn Formula • NS 4 mL per kg body weight per % deep burn during the first 24 hours ▪ To calculate: multiply 4cc X kg X % burn = total fluid requirement ▪ Give half of this amount during the first 8 hours from the time of injury	❑ Same as adult
PARAMEDIC	**PARAMEDIC**
❑ High voltage electrical injury or direct lightning strike with significant tissue destruction • **Sodium Bicarbonate 1 mEq/kg (maximum of 100 mEq)** in 1000 mL NS wide open	❑ Same as adult

BURNS – THERMAL

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
  - Stop the burning process
- ❑ Focused history and physical exam
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Remove items that may constrict swelling tissue
  - Early oxygen therapy with high flow O2 is critical
  - Be alert for the possibility of developing airway compromise
  - Dressings:
    - Partial or Full Thickness (2^{nd} or 3^{rd} degree) < 10% BSA- Wet sterile dressings
    - Partial or Full Thickness (2^{nd} or 3^{rd} degree) > 10% BSA- Dry sterile dressings
  - Maintain patient warmth
- ❑ For Category I burned patients consider AMTS transport from the scene to a designated burn center (University of Utah Hospital)
  - Inhalation injuries
  - Partial or Full Thickness (2^{nd} or 3^{rd} degree) burns greater than 20% body surface area
  - Major trauma with burns
  - Significant portions of the face, hands, or perineum
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available.
  - If possible, avoid placing electrodes over burned skin

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Advanced airway, vascular access per *Resuscitation and Perfusion Core Principle*
  - If possible, avoid placing IV through burned skin
- ❑ Partial or Full Thickness (2^{nd} or 3^{rd} degree) > 10% BSA – Fluid therapy following Parkland Burn Formula
  - NS 4 mL per kg body weight per % deep burn during the first 24 hours
    - To calculate: multiply 4cc X kg X % burn = total fluid requirement
    - Give half of this amount during the first 8 hours from the time of injury

PARAMEDIC

- ❑ Unless Category I burns are present, patients with the potential of significant exposure to CO should be transported to a hyperbaric facility (UVRMC or Intermountain Medical Center (IMC)).

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Same as adult

PARAMEDIC

- ❑ Same as adult

CRUSH INJURIES

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
- ❑ Continuous ECG, CO_2, and Pulse Oximetry monitoring when available

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Core Principle*
  - **NS 0.9%** only
  - When possible, **initiate prior** to patient being freed from object or removed for floor after a prolonged immobile period of time.

PARAMEDIC

- ❑ Constant crush injuries greater than one (1) hour duration
  - **Sodium Bicarbonate 1 mEq/kg (Maximum of 100 mEq)** IV push prior to beginning infusion and up to 2 additional times if patient develops cardiac arrhythmias or a prolonged QRS >.10

    -AND-
  - **Sodium Bicarbonate 1 mEq/kg (maximum of 100 mEq)** in 1000 mL NS wide open.

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Same as adult

PARAMEDIC

- ❑ Same as adult

PNEUMOTHORAX

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Cover open chest wounds with occlusive dressing

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Core Principle*

PARAMEDIC

- ❑ Suspected Tension Pneumothorax
  - Immediate needle decompression of affected side
- ❑ Traumatic Arrest
  - Consider bilateral needle decompression based on mechanism of injury

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Same as adult

PARAMEDIC

- ❑ Same as adult

SKELETAL INJURIES

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Continuous ECG, CO_2, and Pulse Oximetry monitoring when available
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Uncomplicated fractures/dislocations with adequate circulation should be splinted in a position of function/comfort.
  - Fractures/dislocations with circulation deficits or severely angulated injuries are treated with one attempt at placing the extremity in a position of function/comfort. If the attempt is unsuccessful, splint in position found and expedite transport
    - Fractures and joint dislocations without palpable distal pulses are true orthopedic emergencies.
  - For patients with potential pelvic fractures, the treatment of choice is application of the pelvic binder. If unavailable, a cloth sheet or blanket can be wrapped tightly around the pelvis to stabilize it.
  - Isolated proximal femur fractures (especially in the elderly) are usually best managed with anatomical splinting utilizing a scoop stretcher. Traction splints are not appropriate for any proximal femur fractures.
  - Femoral shaft fractures are immobilized utilizing a traction splint unless one of the situations listed below is present:
    - Injuries just proximal to or involving the knee joint
    - Injury to the pelvis
    - Partial amputation
    - Lower leg or ankle injuries
    - If use would delay transport of a patient with a life-threatening condition

ADULT	PEDIATRIC (<37 kg or 80 lbs)
EMT- BASIC PROVIDER	**EMT- BASIC PROVIDER**
EMT- INTERMEDIATE PROVIDER	**EMT- INTERMEDIATE PROVIDER**
❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Principle*	❑ Same as adult
PARAMEDIC	**PARAMEDIC**

SNAKE BITES

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
  - Keep patient movement to a minimum
  - Remove items that may constrict swelling tissue
- ❑ Focused history and physical exam
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Splint limb and place below heart level
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available.

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Vascular access and fluid therapy per Resuscitation and Perfusion Core Principle

PARAMEDIC

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**.** *(Goal is to maintain a mean arterial pressure (MAP) >70 mmHg)*

And/Or

- ❑ **Epinephrine (1:1,000) 2–10 mcg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**. (**Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Same as adult

PARAMEDIC

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg

OR

- ❑ **Epinephrine (1:1,000) 0.1–1 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg. (Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)

SOFT TISSUE INJURIES

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Focused history and physical exam
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Cover lacerations or puncture wounds on the neck near the great vessels or trachea with an occlusive dressing
  - Bleeding from the nose (epistaxis) should be controlled by first having the patient sit and lean forward unless spinal motion restriction is required. Direct pressure by pinching the fleshy portion of the nostrils may effectively control bleeding. An alternate method would be the use of a rolled gauze bandage to apply pressure between the upper lip and gum. The use of appropriate pressure points and/or ice packs (not in direct contact with skin) in combination with direct pressure may also be effective.
  - Cover abdominal eviscerations with a moist sterile dressing
    - Do not attempt to replace organs
  - Cover extruded eye or deflated globe with a moist sterile dressing and protective covering
    - Do not apply pressure or attempt to replace in socket
    - Cover both eyes
  - Large partially attached avulsions should be replaced over injury site when possible
  - Impaled objects should be stabilized in place and covered with dry sterile dressings. The exceptions would be:
    - Objects through the cheek where there is the possibility of airway compromise
    - Objects that would interfere with chest compressions

ADULT	PEDIATRIC (<37 kg or 80 lbs)
EMT- BASIC PROVIDER	**EMT- BASIC PROVIDER**
EMT- INTERMEDIATE PROVIDER	**EMT- INTERMEDIATE PROVIDER**
❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Principle*	❑ Same as adult
PARAMEDIC	**PARAMEDIC**

SPINAL CORD INJURIES

ALL PROVIDERS

- ❑ Scene and patient management per Core Principles
- ❑ Continuous ECG, CO2, and Pulse Oximetry monitoring when available
- ❑ Focused history and physical exam
  - Apply Spinal Motion Restriction Algorithm
- ❑ Develop and implement treatment plan based on assessment findings, resources, and training
  - Be alert for the possibility of developing airway compromise
  - Spinal movement restriction per Disability Core Principle
  - Patients in need of Spinal Motion Restriction that are >20 weeks gestation should be packaged normally and the backboard tilted approximately 15 degrees, left side down

ADULT

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Vascular access and fluid therapy per *Resuscitation and Perfusion Principle*

PARAMEDIC

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**.** *(Goal is to maintain a mean arterial pressure (MAP) >70 mmHg)*

And/Or

- ❑ **Epinephrine (1:1,000) 2–10 mcg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >100 mmHg**. (**Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)

PEDIATRIC (<37 kg or 80 lbs)

EMT- BASIC PROVIDER

EMT- INTERMEDIATE PROVIDER

- ❑ Same as adult

PARAMEDIC

Persistent hypotension unresponsive to fluids

- ❑ **Dopamine 2-20 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg

OR

- ❑ **Epinephrine (1:1,000) 0.1–1 mcg/kg/min** IV infusion per Chart in Appendix for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg. (Epinephrine is the preferred first line medication in anaphylaxis while Dopamine is the first line medication for hypotension due to other mechanisms.)